Technical Description

Modbus® Interface for Sunny Home Manager 2.0

Grid management services

ENGLISH

HM-20-Modbus-NSD-TI-en-12 | Version 1.2

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1 Information on this Document

1.1 Validity

This document is valid for:

- Sunny Home Manager 2.0 from software package 2.10

1.2 Target Group

The tasks described in this document must only be performed by qualified persons. Qualified persons must have the following skills:

- Detailed knowledge of the grid management services
- Knowledge of IP-based network protocols
- Knowledge of the Modbus specifications
- Training in the installation and configuration of IT systems
- Knowledge of and compliance with this document and all safety information

1.3 Content and Structure of this Document

This document describes the Modbus interface of the Sunny Home Manager as well as the variation of the communication protocol "Modbus® Application Protocol" implemented by SMA and the associated data exchange formats for the SMA devices.

This document does not contain any information on software which can communicate with the Modbus interface (see the software manufacturer's manual).

Illustrations in this document are reduced to the essential information and may deviate from the real product.

1.4 Terms and Abbreviations

Term/Abbreviation	Designation	Explanation
ADR	Modbus address	Decimal Modbus register
DWORD	Double WORD	Data with a width of 32 bit, according to IEC 61131-3
IP	Internet Protocol	Network protocol for connections via the Internet.
IP Address	Internet Protocol Address	Internet Protocol-based address in networks that enables direct communication between individual network participants.
NaN	Not a Number	No valid value is available.
NSD	Grid management services	Grid management services are functions that enable control of the grid operation to ensure an unlimited electricity supply at all times.
PMAX	-	Set active power limit. The device can generate active power up to this limit.
RO	Read Only	Value can only be read.
RW	Read / Write	Value can be read and written.
SCADA	Supervisory Control and Data Acquisition	Concept for monitoring and controlling technical processes.

Term/Abbreviation	Designation	Explanation
SMA Grid Guard code	-	The SMA Grid Guard code is a personal code that is required to change grid-related parameters on the inverter. It must be requested from SMA Solar Technology AG.
Susy ID	SMA update system ID	Numeric value that identifies a specific SMA device type
TCP	Transmission Control Protocol	Protocol that controls how data is exchanged between computers.
Unit ID	Unit Identification Data	Clear device identifier in the Modbus protocol.
VPN	Virtual Private Network	VPN is used to establish a connection from one private computer network to another. The point of connection is established on both sides by a VPN gateway. In each case, the VPN gateway may be a computer or a router. The connection itself is described as a VPN tunnel. A secured data stream runs via the tunnel from one network to the other, providing VPN nodes from one network with access to services and devices of the other network.
WO	Write Only	The value can only be written.
WORD	-	Data with a width of 16 bit, according to IEC 61131-3

2 Safety

2.1 Intended Use

The Modbus interface of the Sunny Home Manager is designed for industrial use and has the following tasks:

- Remote control of grid management services
- Remote-controlled querying of measured values
- Remote-controlled changing of parameters

The Modbus interface can only be used via the Modbus TCP protocol.

A maximum of 24 devices can be operated by the Sunny Home Manager.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient, dry place for future reference and observe all instructions contained therein.

2.2 IMPORTANT SAFETY INFORMATION

Keep the manual for future reference.

This section contains safety information that must be observed at all times when working.

The product has been designed and tested in accordance with international safety requirements. As with all electrical or electronical devices, some residual risks remain despite careful construction. To prevent personal injury and property damage and to ensure long-term operation of the product, read this section carefully and observe all safety information at all times.

NOTICE

Damage of SMA products due to cyclical changing of parameters

The parameters of SMA products that can be changed with writable Modbus registers (RW) are intended for long-term storage of device settings. Cyclical changing of these parameters leads to destruction of the flash memory of the SMA products.

Parameters for grid management services to control and limit the nominal PV system power are an exception. Such parameters (system control objects) may be changed cyclically.

- Do not change device parameters cyclically.
- Use the parameters for grid management services for the automated remote control of the PV system.

NOTICE

Manipulation of system data in networks

The Sunny Home Manager is activated by default to the Internet. When connected to the Internet, there is a risk that unauthorized users can access and manipulate the data of your system.

- Set up a firewall.
- Close unnecessary network ports.
- If absolutely necessary, only enable remote access via a virtual private network (VPN).
- Do not use the port forwarding feature. This also applies to the used Modbus ports.
- Disconnect system components from other network components (network segmentation).

2.3 SMA Grid Guard code

To provide grid management services , the PV plant devices must be enabled with an SMA Grid Guard code. The SMA Grid Guard code is also used for logging into the PV plant.

With an SMA Grid Guard code, only one person, communication device or software tool can log into the SMA product.

You can obtain the SMA Grid Guard code via SMA Service or via the "Application for SMA Grid Guard Code" at www.SMA-Solar.com.

3 Product Description

3.1 Remote Control and Remote Parameterization of a PV Plant

3.1.1 Legal provisions

Within the framework of the "Richtlinien zur Förderung von stationären und dezentralen Batteriespeichersystemen zur Nutzung in Verbindung mit Photovoltaik-Anlagen" (directives governing the funding of stationary and decentralised battery storage systems for use in conjunction with PV plants), the use of remote control and remote parameterization of PV plants by network operators is established as a requirement (see source: [BANZ_AT190413B1]).

Remote control and remote parameterization of the PV plant are used for the purposes of grid management services.

The Modbus interface for the Sunny Home Manager fulfils the technical requirements of this directive.

3.1.2 Plant Control

For PV plant login the SMA Grid Guard code is used. To provide grid management services, the PV plant devices must be enabled with an SMA Grid Guard code.

Login and Logout

Log in:

- Login with the Grid Guard code is only possible with the IP address used during login.
- Login with the SMA Grid Guard code remains valid for 60 minutes. Following login with the Grid Guard code, each individual Modbus command prolongs the login status with the Grid Guard code.
  - If no data is transferred via the Modbus interface for a period of 60 minutes, the Sunny Home Manager terminates the Grid Guard mode; if necessary, the Grid Guard code must subsequently be transmitted again.
- For security reasons, login is blocked for the following periods of time following transmission or the entry of an invalid SMA Grid Guard code:
  - First incorrect SMA Grid Guard code entry: 30 seconds
  - Second incorrect SMA Grid Guard code entry: 30 seconds
  - Third incorrect SMA Grid Guard code entry: 30 seconds
  - Third incorrect SMA Grid Guard code entry: 15 minutes (the cycle then restarts)

Time Behavior

- Remote control specifications (via write access to remote control parameters) are valid for 60 minutes. If a parameter is not specified again within 60 minutes, it will be reset to the applicable default setting, as follows:
  - cos(φ) = 1 or reactive power = 0 kvar
  - Active power = 100% or an active power limitation configured in the Sunny Home Manager
- Only one Modbus write command is permitted per second.

Logging off:

- The Grid Guard mode is ended with the code **0**.

Device Restart during Plant Control

- The Sunny Home Manager transmits control commands to the plant at regular intervals. If an SMA device is restarted during an active plant control, it receives the latest control values with the next control cycle.

Logging Of the Plant Control Commands

- The activation, amendment and deactivation of grid management services by means of remote control specifications via Modbus is logged in the plant log book.

Taking Self-Consumption into Account

In case of remote control of the active power actual value (active power limitation) with Modbus register 40016, the Sunny Home Manager will take self-consumption into account depending on the configuration of the "Limitation of the active power feed-in" in Sunny Portal (see User Manual "Sunny Home Manager 2.0"):

- If a limitation of the active power feed-in is configured in Sunny Portal and remote control of the active power actual value is activated, the Sunny Home Manager will take self-consumption into account.
- The setting "no limitation of active power feed-in" results in no active power setpoints being implemented in the inverters.

3.2 System Topology

The Sunny Home Manager with Modbus interface is connected with the SCADA system of the electric utility company or the grid operator via Ethernet. The Modbus interface also enables communication via the Modbus protocol. From the perspective of the Modbus protocol, the Sunny Home Manager with Modbus interface constitutes a Modbus server.

The remote control and remote parameterization of a PV plant have been designed for a hierarchical plant structure. In this structure, the Sunny Home Manager is a communication device which is equipped with a Modbus TCP interface. All other SMA devices that are connected to the Sunny Home Manager via Ethernet are subordinate to the Sunny Home Manager.

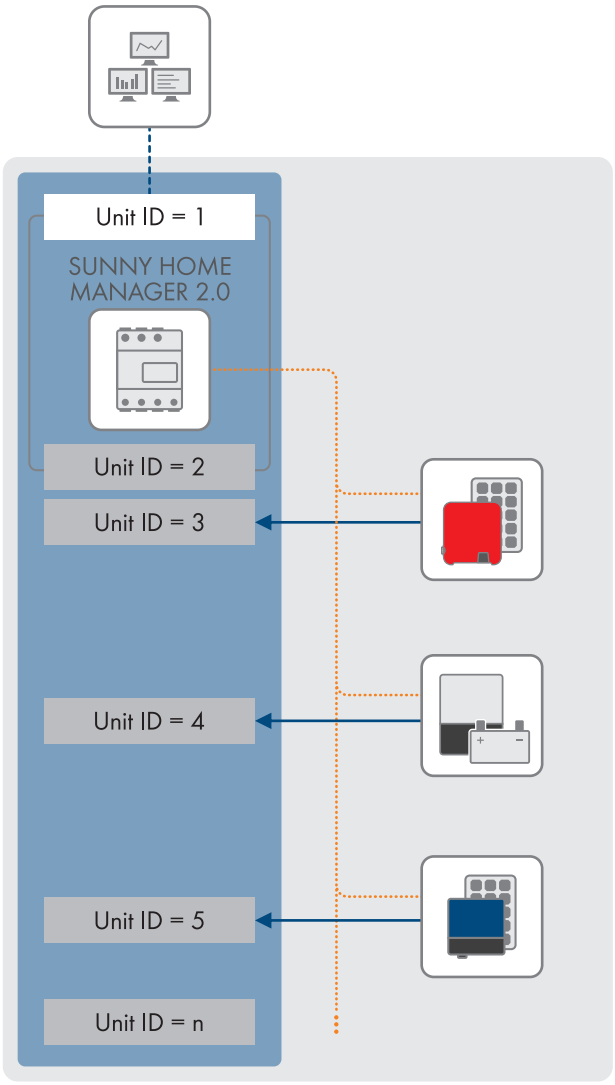

Figure 1: System Topology

4 Interface Description

4.1 Modbus Ports

The following table shows the default setting of the supported network protocols:

Network protocol	Modbus port
TCP	502

Using free ports

Only use free ports when using another port than 502. The following range is generally available: 49152 to 65535.

You can find more information on occupied ports in the database "Service Name and Transport Protocol Port Number Registry" at http://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xml.

Changing the Modbus port

If you change one of the communication ports, you must also change the corresponding Modbus port of a connected Modbus/client system. Otherwise the SMA product can no longer be accessed via the Modbus protocol.

4.2 Modbus Protocol

The Modbus Application Protocol (MBPA) is an industrial communication protocol that is currently used in the solar sector mainly for PV system communication.

The Modbus protocol has been developed for reading data from or writing data to clearly defined data areas. The Modbus specification does not prescribe what data is within which data area. The data areas must be defined device-specifically in Modbus profiles. With knowledge of the device-specific Modbus profile, a Modbus client (e.g. a SCADA system) can access the data of a Modbus server (e.g. the Sunny Home Manager).

The Sunny Home Manager is a Modbus server that provides a Modbus profile for subordinate SMA devices. This Modbus profile contains definitions of individual data points of the SMA devices that are assigned to Modbus registers. The assignment between the data points of the individual SMA devices and Modbus registers is referred to as an SMA Modbus profile and is presented in this document in assignment tables (see Section 6, page 19).

4.3 Addressing and Data Transmission

Addressing MODBUS registers

The Modbus register address is the start address of a data set. A data set equates to a single data set and can consist of one or more Modbus registers depending on the length of the data. The quantity of Modbus registers required is indicated in the assignment tables.

For addressing Modbus registers, the address range 0 to 0xFFFF is available with 65536 addresses. One register is 16 bits wide (WORD). For broader data types, connected registers are used.

In order to avoid inconsistencies, data sets must always be written completely.

Data transmission

In accordance with the Modbus specification, only a specific volume of data can be transported in a single data transmission in a simple protocol data unit (PDU). The data also contains function-dependent parameters such as the function code, start address or number of Modbus registers to be transmitted. The amount of data depends on the Modbus command used and has to be taken into account during data transmission (see Section 4.5, page 13).

With data storage in the Motorola format "Big Endian", data transmission begins with the high byte and then the low byte of the Modbus register.

4.4 Register Address, Register Width and Data Block

A Modbus register is 16 bits wide. For wider data items, connected Modbus registers are used and considered as data blocks. The address of the first Modbus register in a data block is the start address of the data block. The number of connected Modbus registers arises from the data type and the offset between the register addresses. Several Modbus registers with different start addresses, that can only be processed as a data block, are specially marked. In addition, larger data blocks can be formed.

4.5 Reading and Writing of Data

The following Modbus commands are supported by the implemented Modbus interface:

Modbus command	Hexadecimal value	Data volume (number of registers)
Read Holding Registers	0x03	1 to 125
Read Input Registers	0x04	1 to 125
Write Single Register	0x06	1
Write Multiple Registers	0x10	1 to 123
Read Write Multiple Registers	0x17	Read: 1 to 125, Write: 1 to 121

Writing Modbus registers

The basis of the Modbus interface described in this document is that n Modbus registers must be written in one step. If for example two 2-byte Modbus registers are generated from a 4-byte SMA data type, the four bytes of both registers must be set with one write operation.

Only one Modbus write command is permitted per second.

Modbus exception when reading and writing of a register fails

For each inverter type, only certain Modbus registers are available. If a Modbus register is not available for an inverter type, a Modbus exception will be generated when this register is written in or read. Modbus exceptions are also generated when write access occurs on a read-only Modbus register or read access occurs on a write-only Modbus register.

Modbus exception when writing in multiple registers fails

If several registers in the packet are written one after another (Modbus commands 0x10 and 0x17) and an error occurs during writing, the faulty register as well as all the subsequent registers in the packet will not be written. In the event of an error, a Modbus exception will be generated.

NaN as answer

If an undefined value is called up from a Modbus register, "NaN" is returned as the answer.

Modbus exceptions

Information on Modbus exceptions you will find in the source "Modbus Application Protocol Specification" at http://www.modbus.org/specs.php.

4.6 SMA Data Types

The SMA data types are listed in the assignment tables in the **Type** column. The SMA data types describe the data widths of the assigned values:

4.6.1 Integer Values

16-Bit Integer Values

16 bit integers are stored in one Modbus register in big-endian sorting.

Modbus register	1	
Byte	0	1
Bits	8 to 15	0 to 7

S16: -32,767 to 32,767

U16: 0 to 65,535

32-Bit Integer Values

32 bit integers are stored in two Modbus registers in big-endian sorting.

Modbus register	1		2	
Byte	0	1	2	3
Bits	24 to 31	16 to 23	8 to 15	0 to 7

ENUM (status/24 bit): 0 to 1,677,212

S32: 2,147,483,647 to 2,147,483,647

U32: 0 to 4,294,967,294

4.6.2 NaN Values

The following table shows the data types used in the SMA Modbus profile and compares these to possible NaN values. The SMA data types are listed in the assignment tables in the **Type** column. The SMA data types describe the data widths of the assigned values:

Type	Explanation	NaN value
ENUM	Encoded status value as double word (32 bit/DWORD) in the local processor format	0x00FF FFFD
S16	A signed word (16 bit/WORD) in the local processor format	0x8000
S32	A signed double word (32 bit/DWORD) in the local processor format	0x8000 0000
V16	A word (16-bit/WORD) in the local processor format	0xFFFF
V32	A double word (32 bit/DWORD) in the local processor format	0xFFFF FFFF

4.7 SMA Data Formats

The following SMA data formats describe how SMA data is to be interpreted. The data formats are used, for example, for the display of data or for its further processing. The SMA data formats are listed in the **Format** column of the assignment tables.

Format	Explanation
DT	Date/Time Transmission in seconds since 1970-01-01.

Format	Explanation
ENUM	Output as encoded status values Display of settings in abbreviations, e.g., for operating states or selected procedures for set-point. Here it is only possible to select one numerical value in each case. The breakdown of the possible codes can be found directly under the designation of the Modbus register in the assignment tables.
FIX0	Factor 1 Output as decimal number, commercially rounded, no decimal places.
FIX1 to FIX4	Scaling factor to define the decimal places (up to 4) Output as decimal number, commercially rounded, number of decimal places in accordance with the number (FIX2 corresponds to a decimal number with 2 decimal places)
RAW	Output as text or number, depending on data format of the value. A RAW number has no decimal places and no thousand or other separation indicators.

5 Configuration

5.1 Configuring Grid Management Services in Sunny Portal

As part of grid management services, it may be necessary to implement grid operator specifications for active power limitation and for reactive power feed-in in your PV system. The Sunny Home Manager can receive these specifications via Ethernet-based communication (Modbus). The grid operator can set up this link. For this, you have to activate grid management services for the Sunny Home Manager.

For the case of remote control of the active power setpoint (active power limitation) with Modbus register 40016, the limitation of the active power feed-in must also be activated.

Requirements:

☐ The devices in the PV plant must be connected to the Sunny Home Manager and the PV plant must have been commissioned.

☐ The Sunny Home Manager must have an Internet connection.

☐ The Sunny Home Manager must be registered in Sunny Portal and the devices must be added to the plant.

☐ You must have the user role **Installer** or **PV System Administrator** .

Procedure:

1. Log in to Sunny Portal (see Sunny Home Manager user manual).
2. Select **Configuration > PV system properties** in the page and menu selection.
3. Select the tab **Parameters**.
4. Select [**Edit**].
5. If necessary, set a limit for the active power feed-in in the **Limitation of active power feed-in** area:
   If you do not need a hard-configured limit, select the option **Implement external setpoints only**.
   If you need to set a limit, you must enter a value **xx** either in the **Max. xx % of system power** field or in the **max. xx kW** field. The smallest limiting value in the system is always used.
6. Select the appropriate option in the area **Grid management services via Ethernet based communication**:
   If the Sunny Home Manager does not have to implement any grid operator specifications, select **No** (default setting).
   If the Sunny Home Manager has to implement any grid operator specifications, select **Yes**.
7. The factory-set port **502** in the section **Grid management services via Ethernet based communication** an normally remain set.
   Change port if necessary: If there are several Modbus devices in the network or if the grid operator specifications are to be transmitted via a certain port, enter this port in **Port xxx**.
   If you change this port, you must also change the port in your VPN router and inform the grid operator of this change.
8. Click on [**Save**].

☑ The data is being transferred. This can take up to 5 minutes.

5.2 Unit IDs

5.2.1 Information on Unit IDs

The Unit ID is a superordinate addressing type in the Modbus protocol. The SMA Modbus protocol has 247 Unit IDs, of which 245 can be assigned to individual devices. If a Unit ID is assigned to a device, then the parameters and measured values of this device can be accessed.

The following table shows the Unit IDs supported by the Sunny Home Manager:

Unit ID	Explanation
1	Reserved for information about the Sunny Home Manager and for the plant overview
2	Reserved for the plant parameters and measured values
3 to 247	Freely available

Do not assign duplicate Unit IDs

You must not assign duplicate Unit IDs. If there is a duplicate assignment of a Unit ID, the device data that is entered in the assignment table of the Unit IDs (plant overview) under the lowest Modbus address is always read out in the event of a Modbus request of this Unit ID.

5.2.2 Changing Unit IDs

Procedure:

You can change the Unit IDs of SMA devices. A change is required, for example, if additional or modified SMA devices are assigned the Modbus Unit ID = 255 (NaN) via automatic detection. With this Unit ID, the devices cannot be addressed and cannot be accessed via the Modbus protocol. You must assign these devices individual, freely available Unit IDs (3 to 247).

- Read out plant overview (Unit ID = 1)
- Change the Unit ID in the plant overview

Reading Out the Plant Overview

You can read out the individual Unit IDs of the SMA devices from the plant overview via the Modbus interface. You can access this assignment table via Unit ID = 1.

The assignment of Unit IDs 3 to 247 is saved in the Modbus registers from address 42109. For this purpose, every assignment comprises an address area of four Modbus registers (see the following example).

Example for an assignment table

After the automatic detection of a new SMA device (C), the plant overview may appear as follows:

ADR	Content	Description	Device #
...	...	...	
42109	158	Susy ID	A
42110	2145600972	Serial number	A
42112	3	Unit ID	A
42113	158	Susy ID	B
42114	2145600320	Serial number	B
42116	4	Unit ID	B
42117	158	Susy ID	C
42118	2145600934	Serial number	C
42120	255	Unit ID	C
...	...	...	...

ADR	Content	Description	Device #
43085	65535	Susy ID	X
43086	4294967295	Serial number	X
43088	65535	Unit ID	X

Changing a Unit ID in the Plant Overview

You change a Unit ID by writing it to the corresponding Modbus address; you can do this using your Modbus master system, e.g., a SCADA system.

To change a Unit ID in the plant overview, all three registers belonging to a device must be written in one block. For the following example, this means that all the data of the three Modbus addresses 42113, 42114 and 42116 must be written.

Example for Changing the Unit ID in the Plant Overview

The following table shows an example assignment. An inverter with SUSy ID = 160 and serial number 1134365300 was subsequently detected as a second device in the PV plant (Modbus addresses 42113 to 42116). The Unit ID of this device was manually set to 4:

ADR	Designation	After detection	Modified
42113	Susy ID	160	160
42114	Serial number	1134365300	1134365300
42116	Unit ID	255 (NaN)	4

6 Assignment Tables

6.1 Information on Assignment Tables

The following subsections are sorted by unit ID. Each contains a table of the Modbus registers which can be accessed using this unit ID. The tables present the following information:

Information	Explanation
ADR	Decimal Modbus register
Description/number codes	Short description of the Modbus register and the number codes used
CNT	Number of assigned Modbus registers
Type	Data type
Format	Data format of the saved value
Access	Access type

6.2 Unit ID = 1 (Sunny Home Manager)

The following table lists the parameters provided by the Sunny Home Manager and measured values that can be accessed at Unit ID = 1:

ADR	Description/number codes	CNT	Type	Format	Access
30001	Version number of the SMA profile	2	U32	RAW	RO
30003	SUSy ID (Sunny Home Manager)	2	U32	RAW	RO
30005	Serial number (Sunny Home Manager)	2	U32	RAW	RO
30007	Modbus data change: meter value is increased by the Sunny Home Manager if new data is available (meter value may overflow)	2	U32	RAW	RO
30051	Device class: 8128 = Communication products	2	U32	ENUM	RO
30053	Device type: 9343 = Sunny Home Manager	2	U32	ENUM	RO
30055	Manufacturer: 461 = SMA	2	U32	RAW	RO
30057	Serial number (Sunny Home Manager)	2	U32	RAW	RO
30193	UTC system time (s)	2	U32	DT	RO

Unit ID assignment – SMA devices (plant overview):(see Section 5.2.1, page 16)

ADR	Description/number codes	CNT	Type	Format	Access
42109	Device 1: SUSy ID	1	U16	RAW	RW
42110	Device 1: serial number	2	U32	RAW	RW
42112	Device 1: Unit ID (e.g. 3)	1	U16	RAW	RW

ADR	Description/number codes	CNT	Type	Format	Access
42113	Device 2: SUSy ID	1	U16	RAW	RW
42114	Device 2: serial number	2	U32	RAW	RW
42116	Device 2: Unit ID (e.g. 4)	1	U16	RAW	RW
...	...	...	...	...	...
43085	Device 245: SUSy ID	1	U16	RAW	RW
43086	Device 245: serial number	2	U32	RAW	RW
43088	Device 245: Unit ID (e.g. 247)	1	U16	RAW	RW

SMA Grid Guard-Code (see Section 2.3, page 7) (see Section 3.1.2, page 9)

ADR	Description/number codes	CNT	Type	Format	Access
43090	**Reading the register:** Number of PV plant devices currently enabled via the SMA Grid Guard code. **Writing the register:** SMA Grid Guard code for logging in to the PV plant and enabling the plant devices. **Logging off:** Write 0 in the register to log out of Grid Guard mode.	2	U32	FIX0	RW

Reading and writing the table

The parameters and measured values under Unit ID = 1 can also be read or written if no log in has taken place using the SMA Grid Guard code.

6.3 Unit ID = 2 (System)

In the following table you can find the parameters and measured values that you can access via Unit ID= 2. These plant parameters and measured values represent the view of the entire plant. Parameters such as time settings are transferred by the Sunny Home Manager to the devices of the PV system and there, depending on the device type, processed further. Measured values such as energy meter values are queried by the devices and made available as accumulated values:

The plant parameters under Unit ID = 2 can only be read or written if a log in has taken place using the SMA Grid Guard code.

ADR	Description/number codes	CNT	Type	Format	Access
30193	UTC system time (s)	2	U32	DT	RO
30201	System status: • 307 = OK • 455 = Warning • 35 = Error	2	U32	ENUM	RO
30581	Energy drawn from the utility grid (Wh) on all phases	2	U32	FIX0	RO

ADR	Description/number codes	CNT	Type	Format	Access
30583	Energy fed in the utility grid (Wh) on all phases	2	U32	FIX0	RO
30865	Active power (W) drawn from the utility grid on all phases	2	S32	FIX0	RO
30867	Active power (W) fed in the utility grid on all phases	2	S32	FIX0	RO

Supported PV inverters

ADR	Description/number codes	CNT	Type	Format	Access
40015	Reactive power setpoint Q, in % of the maximum active power (PMAX) of the PV plant. Value range: • -100% to -1% = load • 0 = no reactive power • +1% to +100% = generator	1	S16	FIX0	WO
40016	Active power setpoint P, in % of the maximum active power (PMAX) of the PV plant Value range: • -100% to -1% = load • 0 = no active power • +1% to +100% = generator	1	S16	FIX0	WO
40024	Displacement power factor cos(φ): • 0.0000 to 1.0000	1	U16	FIX4	WO
40025	Excitation type of cos(φ): • 1041 = Overexcited • 1042 = Underexcited	2	U32	ENUM	WO

Supported battery inverters:

ADR	Description/number codes	CNT	Type	Format	Access
40149	Active power setpoint (W) for "Plant control" operating mode	2	S32	FIX0	WO
40151	Control of active power and reactive power via communication (operating mode “Plant control”): • 802 = Active • 803 = Inactive	2	U32	ENUM	WO
40153	Reactive power setpoint (var) for "Plant control" operating mode	2	S32	FIX0	WO

6.4 Unit 3 to 247 (inverters)

In the following table you can find the parameters for the supported PV and battery inverters that you can access via Unit ID= 3 to 247:

Parameterization of PV and battery inverters

The parameters of the PV and battery inverter can only be read or written if a log in has taken place using the SMA Grid Guard code.

Register 30825, operating mode of the reactive power regulation

The operating modes of the reactive power control are not supported by all devices. Please see the device documentation for possible operating modes.

ADR	Description/number codes	CNT	Type	Format	Access
30233[1)]	Permanent active power limitation (W)	2	U32	FIX0	RO
30825	Operating mode of the reactive power regulation: • 303 = Off • 1069 = Reactive power/voltage characteristic curve Q(V) • 1070 = Reactive power Q, direct setpoint • 1071 = Reactive power const. Q (kVAr) • 1072 = Reactive power Q, setpoint via plant control • 1073 = Reactive power Q(P) • 1074 = cos φ, direct setpoint • 1075 = cos(φ), setpoint via plant control • 1076 = cos(φ(P)) – characteristic curve • 1387 = Reactive power Q, setpoint via analog input • 1388 =cos φ, setpoint via analog input • 1389 = Reactive power/voltage characteristic curve Q(V) with hysteresis and deadband	2	U32	ENUM	RO
30831	Cos φ setpoint	2	S32	FIX2	RO
30833	Setpoint, excitation type of cos φ: • 1041 = Overexcited • 1042 = Underexcited	2	U32	ENUM	RO

[1)] Valid only for PV inverters

ADR	Description/number codes	CNT	Type	Format	Access
40200	Operating mode of the reactive power regulation: • 303 = Off • 1069 = Reactive power/voltage characteristic curve Q(V) • 1070 = Reactive power Q, direct setpoint • 1071 = Reactive power const. Q (kVAr) • 1072 = Reactive power Q, setpoint via plant control • 1073 = Reactive power Q(P) • 1074 = cos φ, direct setpoint • 1075 = cos(φ), setpoint via plant control • 1076 = cos(φ(P)) – characteristic curve • 1387 = Reactive power Q, setpoint via analog input • 1388 =cos φ, setpoint via analog input • 1389 = Reactive power/voltage characteristic curve Q(V) with hysteresis and deadband • 2269 = Reactive power characteristic curve • 2270 = cos(Phi) or Q default setting via plant control	2	U32	ENUM	RW
40206	Cos φ setpoint	2	S32	FIX2	RW
40208	Setpoint, excitation type of cos φ: • 1041 = Overexcited • 1042 = Underexcited	2	U32	ENUM	RW
40216	Operating mode of active power limitation at over-frequency P(f): • 303 = Off • 1132 = Linear gradient for instantaneous power	2	U32	ENUM	RW
40218	Linear instantaneous power gradient configuration: difference between starting frequency and grid frequency (Hz)	2	U32	FIX2	RW
40220	Linear instantaneous power gradient configuration: difference between reset frequency and grid frequency (Hz)	2	U32	FIX2	RW
40222	Configuration of the cos (φ(P)) characteristic curve: cos φ of the starting point	2	U32	FIX2	RW
40224	Configuration of the cos (φ (P)) characteristic curve: excitation type of the starting point: • 1041 = Overexcited • 1042 = Underexcited	2	U32	ENUM	RW

ADR	Description/number codes	CNT	Type	Format	Access
40226	Configuration of the cos (φ (P)) characteristic curve: cos φ of the end point	2	U32	FIX2	RW
40228	Configuration of the cos (φ (P)) characteristic curve: (excitation type of the end point): • 1041 = Overexcited • 1042 = Underexcited	2	U32	ENUM	RW
40230	Configuration of the cos (φ (P)) characteristic curve: active power of the starting point (%)	2	U32	FIX0	RW
40232	Configuration of the cos(φ(P)) characteristic curve: active power of the end point (%)	2	U32	FIX0	RW

7 Contact

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